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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,977	06/02/2001	Ron McCabe	1735.2.2J	3297
20575	7590	07/17/2006		
MARGER JOHNSON & MCCOLLOM, P.C. 210 SW MORRISON STREET, SUITE 400 PORTLAND, OR 97204			EXAMINER LIN, WEN TAI	
			ART UNIT 2154	PAPER NUMBER

DATE MAILED: 07/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/873,977

Applicant(s)

MCCABE ET AL.

Examiner

Wen-Tai Lin

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2154

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 April 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 4,6,10,11,17-24,29,30 and 42-53 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 29,30 and 52 is/are allowed.
- 6) ☒ Claim(s) 4,6,10, 17-24, 42-46, 51 and 53 is/are rejected.
- 7) ☒ Claim(s) 11,47 and 50 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. Claims 4, 6, 10-11, 17-24, 29-30 and 42-53 are presented for examination. Claims 4, 6, 10-11, 17-24, 29-30 and 42-44 have been amended and claims 45-53 are newly added.
2. The text of those sections of Title 35, USC code not included in this action can be found in the prior Office Action.
3. It is noted that the previous 101 rejection on claim 30 is maintained because the amended claim language still does not make the storage medium tangibly embodied in a manner so as to be executable (e.g., causing a computing device to execute the program stored in the medium). Note that Applicant indicated in the remarks that the word "medium" has been changed to "apparatus" for this claim, however such intention has not been reflected in claim 30.
4. Claims 21-24 are objected to because the following terms lack antecedent basis:
In claim 21, "the mirroring unit"; and
In claim 23, "the additional mirroring unit".

Claim Rejections - 35 USC § 102

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5. Claims 4, 6, 10, 42, 45-46, 48-49, 51 and 53 are rejected under 35 U.S.C. 102(e) as being anticipated by Ofek et al.[U.S. Pat. No. 5889935].

6. Ofek was cited in the previous office action.

7. As to claims 4 and 49, Ofek teaches the invention as claimed including: a method for data mirroring [e.g., Abstract; Fig.12; note that ther4, 4e are primary and secondary mirroring units in the system], comprising:

receiving change data from a source [e.g., receive a write command chain from the host (212, Fig.12)], the change data received in a mirroring unit [the write commands are synchronized between 214 and 246 of Figs. 4] and;

storing a changed logical block number in a buffer in the mirroring unit [e.g., 504-505, Fig.18], the changed logical block number indicating a logical block on the source corresponding to the change data [e.g., col.36, line 14- col.39, line 4, wherein a host writes data (which includes logical track number) into a primary storage also sends the same write commands to the remote mirroring unit].

8. As to claim 6, since the features of this claim can also be found in claims 4, it is rejected for the same reasons set forth in the rejection of claims 4 above.

9. As to claim 10, Ofek further teaches that the means for storing the changed logical block number further comprises a data structure including block checksums corresponding to the

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change data [e.g., col. 38, line 57- col.39, line 4; i.e., a checksum (CRC) following the transmission of the link queue].

10. As to claim 42, Ofek teaches the invention as claimed including: a method for data storage management, comprising:

creating a set of mirrored data elements in a mirroring unit, the first set of mirrored data elements including all data of a mirrored volume at a first time [note that it is inherent that the first set of mirrored elements includes the entire mirrored volume at a first time];

maintaining the set of mirrored data elements; and

maintaining an ordered queue of change data in the mirroring unit, wherein a combination of at least one entry of the ordered queue and the set of mirrored data elements includes all data of the mirrored volume at a second time [col.31, lines 16-40; note that the “ordered queue” is being broadly interpreted in accordance with Applicant’s specification at page 50 lines 2-7].

11. As to claim 45, Ofek further teaches:

selecting an entry of the ordered queue; and

storing the set of mirrored data elements as modified by the selected entry and any older entries of the ordered queue in the mirrored volume [e.g., col.31, lines 31-59].

12. As to claim 46, Ofek further teaches:

changing the set of mirrored data elements in response to an oldest entry of the ordered queue; and

removing the oldest entry from the ordered queue [note that inherently a log file can only keep a limited number of versions of the data at any given location and the oldest entry would have to be removed to save space for newer data version].

13. As to claim 48, Ofek further teaches that receiving the change data from the source further comprises receiving the change data from a local mirror, the local mirror including a mirror of a storage volume of a host, wherein receiving the change data from the source further comprises receiving the change data from a host, the change data corresponding to a data change on a storage volume of the host [e.g., Figs. 4 and 12, wherein the remote secondary storage 246 is synchronized with the primary storage 212 by receiving write data issued to the primary storage].

14. As to claim 51, Ofek further teaches that storing the changed logical block number in the buffer further comprises storing the changed logical block number in the buffer without storing the change data [e.g., the track number of the changed data is stored in buffer 504 of Fig.18].

15. As to claim 53, Ofek further teaches that maintaining the set of mirrored data elements and maintaining the ordered queue of change data further comprises maintaining the set of mirrored data elements and maintaining the ordered queue of change data on the same physical

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storage system [e.g., the ordered queue (such as 504-505 Fig.18 or 291-292 of Fig.12 all belongs to the same primary storage)].

Claim Rejections - 35 USC § 103

16. Claims 17-24 and 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ofek et al.(hereafter "Ofek") [U.S. Pat. No. 5889935], as applied to claims 4, 6, 10, 42, 45-46, 48, 51 and 53 above, further in view of Stallmo et al.(hereafter "Stallmo") [U.S. Pat. No. 5787459].

17. As to claims 17-19, Ofek teaches the invention substantially as claimed including: a method for data mirroring, comprising:

monitoring write activities from a host to a first storage volume [note that maintaining a log file of all writes require the act of monitoring];

buffering a communication on the first bus between the host and the first storage volume [e.g., the bus between 212 and 214 of Fig.12]; and

repeating the communication to a second storage volume in a mirroring unit [e.g., 246 of Fig.12] through a second bus, wherein buffering the communication further comprises buffering write nature commands[e.g., 240, Fig.12; col.31, lines 16-40].

Ofek does not specifically teach the monitoring is performed by snooping a bus over which a host and a first storage volume for the host communicate.

However, Stallmo teaches a method of obtaining data storing activities by snooping a bus between a host and a storage system [Stallmo: col.17, lines 9-21]. It would have been obvious to

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combine the teachings of Ofek and Stallmo by monitoring the bus between Ofek's host and first storage volume because (1) Ofek does not set a preference of how the write activities is obtained and (2) it is well known that using passive monitoring for obtaining intended information from a bus is more effective in that the host does not require to use additional CPU time to duplicate the intended information for another units.

18. As to claim 20, Stallmo further teaches that there are more than one redundant disk in the system [e.g., Fig.2], as such, it is obvious to repeat the communication to a third storage volume in an additional mirroring unit through a third bus using the monitoring technique described above [note that Ofek's system is also motivated for redundancy: see col.12, lines 33-44].

19. As to claim 21, since the features of this claim can also be found in claims 17, it is rejected for the same reasons set forth in the rejection of claims 17 above.

20. As to claim 24, Ofek further teaches that the first bus further comprises a SCSI bus [e.g., col.46, lines 32-35; i.e., a SCSI Channel Adapter].

21. As to claims 22-23 and 43-44, since the features of these claims can also be found in claims 17-21 and 42, they are rejected for the same reasons set forth in the rejection of claims 17-21 and 42 above.

22. Claims 29-30 and 52 are allowable.

23. Claims 11, 47 and 50 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

24. Applicant's arguments filed on 4/28/06 for claims 4, 6, 10, 17-24 and 42-44 have been fully considered but are moot in view of the new ground(s) of rejection.

25. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, THIS ACTION IS MADE FINAL. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

26. A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Conclusion

Examiner note: Examiner has cited particular columns and line numbers in the references as applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to the specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the contest of the passage as taught by the prior art or disclosed by the Examiner.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wen-Tai Lin whose telephone number is (571)272-3969. The examiner can normally be reached on Monday-Friday (8:00-5:00) .

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Follansbee can be reached on (571)272-3964. The fax phone numbers for the organization where this application or proceeding is assigned are as follows:

(571)273-8300 for official communications; and

(571)273-3969 for status inquires draft communication.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Wen-Tai Lin

July 7, 2006

Wen-Tai Lin
7/7/06